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MCDERMOTT WILL & EMERY LLP
600 13TH STREET, NW
WASHINGTON, DC 20005-3096

EXAMINER	
WANG, EUGENIA	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/555,447	FUJINO ET AL.	
	Examiner	Art Unit	
	EUGENIA WANG	1726	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 January 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4,6 and 9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4,6 and 9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. In response to the amendment received January 19, 2011:

a. Claim 9 has been added as per Applicant's request. Claims 1, 4, 6, and 9 are pending.

b. The previous 112 rejections have been withdrawn in light of the amendment with the exception of the 112 rejection dealing with broad and narrow range recitations.

c. The core of the previous prior art rejection of record has been maintained, with slight changes made in light of the amendments. All changes made are made in light of the amendment. Thus the action is final.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1, 4, 6, and 9 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a non-woven fabric thickness of not less than 15 μm and not more than 50 μm (wherein 25 μm is a specifically appreciated point), does not reasonably provide enablement for the lower limit of not less than 10 μm. The specification does not enable any person skilled in the art to which it pertains, or with

which it is most nearly connected, to make/use the invention commensurate in scope with these claims. The pertinent factors of Undue Experimentation are listed below:

(A) Breadth of claims

That the non-woven fabric has a thickness of not less than 10 μm and not more than 25 μm.

(B) Nature of the invention, (F) Amount of direction provided by the inventor, (G) Existence of working examples

Paragraph 0017 and paragraph 0047 appear to appreciate the lower limit of 15 μm and the upper limit of 50 μm. The working examples (table 1) appear to mainly support this, wherein only 1 example is given below the 15 μm lower limit of the broadly appreciated range (as set forth above) (at 10 μm). Accordingly, the majority of the specification, as written appears to support the lower limit of 15 μm, whereas an example provided appears to contradict the bulk of the disclosure. Additionally, there is nothing in the specification that appears to appreciate the range between 10 μm and 15 μm.

(H) Quantity of experimentation needed to make or use the invention based on the content of the disclosure

It is submitted that great experimentation would be required to make/use the invention, as the bulk of the disclosure appears to contradict the one specific example of non-woven fabric at 10 μm (table 1; para 0017; para 0047). In such a manner, it is unsure if 10 μm for the non-woven fabric was appreciated as part of the exemplified range of the disclosure. Additionally, no examples are provided at any points between

10 and 15 μm, wherein there is no statement as to such a range's applicability. Accordingly, great experimentation would need to be done (with different materials, thicknesses, as applied to all aspects of the invention) in order ascertain viability for a portion of the claimed range.

3. Claims 1, 4, 6, and 9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 1 recites the broad recitation of having a porous film with a thickness of 0.5 to 10 μm, inclusive, and a non-woven fabric having a thickness of 10 to 25 μm, which yields a total thickness having a lower limit of 10.5 μm and an upper limit of 35 μm, and the claim also recites the fact that the total thickness has a lower limit of 15 μm

and an upper limit of 30 μm which is the narrower statement of the range/limitation. Since claims 4, 6, and 9 are dependent upon claim 1, they are rejected for the same reason.

Response to Arguments

4. Applicant's arguments filed January 19, 2011 have been fully considered but they are not persuasive.

Applicants argue that the claim amendments overcome the previous 112 rejections.

Examiner respectfully disagrees with one count (with respect to broad and narrow range claimed). It appears that such an issue still exists (as the total thickness claimed is not commensurate with the additive values of the individual thicknesses). Thus such an argument is not found to be persuasive, and the rejection of record I maintained. (It is noted that the amendments introduce new 112 issues, as the disclosure appears to be contradictory with respect to the thickness of the non-woven fabric.)

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1, 4, 6, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6287720 (Yamashita et al.) in view of US 6,576,366 (Fujiwara et al.), and US 2005/0014064 (Shi et al.), and US 5869208 (Miyasaka).

As to claim 1, Yamashita et al. teach a nonaqueous secondary battery with a nonaqueous electrolyte with a positive electrode comprising cathode active material, a negative electrode comprising anode active material, and a separator disposed between the positive and negative electrodes, operatively with the electrolyte (col. 5, lines 8-23). Furthermore, Yamashita et al. exemplify a lithium ion secondary battery with a cathode active material made of a composite of a lithium oxide (col. 11, lines 7-10). An anode active material inherently has the property of absorbing and desorbing lithium. Example 6 has a separator [13B] made of polyethylene (col. 30, lines 63-66). Additionally, example 6 has a second layer of the separator that acts as a porous film [13A] made of insulating substance (filler) α-Al_2O_3 and binder polyvinylidene fluoride (PVDF), where the porous film [13A] is directly formed on the cathode active material layer [11b] (col. 29, lines 51-58; col. 30, lines 5-8). Furthermore, the weight ratio of α-Al_2O_3 to PVDF is 100/5 (col. 29, lines 63-64). Therefore, the weight percentage is:

$$\frac{wt\_alumina}{total\_wt} = \frac{100}{100+5} * 100\% = 95.2\%$$

Furthermore, Yamashita et al. teaches that Figs. 7(a) to (c) show with all of the structural attributes of their battery and can additionally be spirally wound to form a spirally wound unit cell (col. 16, lines 41-48).

Yamashita et al. does not teach that (a) the separator comprises a non-woven fabric, (b) that the non-woven fabric has a melt-down temperature of 150℃ or more, (c) the thicknesses of each individual section of the separator: 0.5 μm to 10 μm [13A] for

the porous film layer and 15 μm to 25 μm for the non-woven fabric [13B], wherein the total thickness is 15.5 μm to 30 μm, or (d) that the battery is cylindrical in shape

With respect to (a), Fujiwara et al. teaches a non-aqueous electrolyte secondary cell (title). In the teaching, materials of separators are disclosed including olefin polymers, such as polyethylene (as used by Yamashita et al. in example 6), and non-woven cloth (col. 9, lines 27-38). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the non-woven cloth taught by Fujiwara et al. for the separator of Yamashita et al.'s battery, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416.

With respect to (b), Shi et al. teaches a high melt integrity battery separator for lithium ion batteries (title). The separators are made of nonwoven flat sheets, wherein high temperature melt integrity means that the separator will sustain dimensional stability until a temperature of at least 200℃ (abstract; para 0011). The motivation for providing nonwoven flat sheet separators with this characteristic is in order to better maintain dimensional stability within a battery. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use the materials of Shi et al. (nonwoven flat sheets) in order to improve dimensional stability of the separator at higher temperatures.

With respect to (c), it is first noted that Yamashita et al. teaches a separator [13A, 13B] with a thickness between 100 nm to 100 μm (col. 7, lines 52-55). Specifically, the

composite separator thickness of example 6 (relied upon) is 25 μm (and thus lies in the claimed range of the total thickness) (col. 31, lines 10-13). Although Yamashita et al. does not mention the thicknesses of each individual section of the separator, 15 μm to 25 μm for the non-woven fabric [13B] and 0.5 μm to 10 μm [13A] for the porous film layer, fig. 5 show a proportion of the layers (i.e. substantially equal), which at the very least would render obvious the proportion shown. As applied to example 6, wherein the total thickness is 25 μm, each layer being 12.5 μm would be obvious (in light of the proportions shown in fig. 5), wherein 12.5 μm is seen to be close to the upper limit of the porous film thickness (10 μm as claimed) as well as the lower limit of the non-woven fabric thickness (15 μm as claimed). It has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985). Additionally, claims that differ from the prior art only by slightly different (non-overlapping) ranges are prima facie obvious without a showing that the claimed range achieves unexpected results relative to the prior art. (In re Woodruff, 16 USPQ2d 1935,1937 (Fed. Cir. 1990)).

As to (d), Miyasaka teach of a similar battery, wherein a wound battery is embodied, wherein a cylindrical shape is taught as well (col. 7, lines 50-64). Therefore at the very least, one of ordinary skill in the art would find that combining a wound battery and a cylindrical shaped battery would have yielded the predictable result of resulting in a battery that would operate as such (and thus shaping a secondary battery

to achieve such a desired shape would be within the skill of the ordinary artisan). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use a cylindrically shaped wound battery, as the application of such a shape to the wound assembly would have yielded the predictable result of providing an operating battery.

As to claim 4, the combination teaches the claim limitation, as Shi et al. teaches nonwoven flat sheets, which are fibers that are held together, used for separators; specific fibers are polyamides and polyimides (para 0013). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the nonwoven flat sheets of Shi et al. as the separator for a battery, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416.

As to claim 6, Yamashita et al. teaches different binders. Examples include PVDF (as used in previously cited example 6) and acrylonitrile-butadiene (copolymer latex) (col. 7, lines 59-65).

As to claim 9, the combination teaches the claim limitation, as Shi et al. renders obvious the use of nonwoven flat sheets, which are fibers that are held together, used for separators; specific fibers include polyamides (para 0013). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the nonwoven flat sheets of Shi et al. as the separator for a battery, since it has been held to be within the general skill of a worker in the art to select a known material on the

basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416.

6. Claims 1 and 4, are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyasaka in view of Nakamizo et al. and Shi.

As to claim 1, Miyasaka teaches of a lithium ion secondary battery (col. 1, lines3-7). Miyasaka's positive electrode material is a lithium metal oxide (col. 2, lines 37-44, specific examples seen in col. 11, lines 44-52). Furthermore, the negative electrode is capable of receiving (absorbing) and releasing (desorbing) lithium ion/metal (col. 6, lines 54-58). There is a separator [10] which separates the positive electrode [8] and negative electrode [9] (col. 7, lines 54-65; fig.). Miyasaka exemplifies two types of separator material a sheet and a non-woven sheet (fabric) (col. 9, lines 62-67). Furthermore it is noted that there is a protective layer (porous film) formed on the surface of the positive electrode (col. 6, lines 59-64). First it is noted that the protective layer has small openings/voids, showing that is it porous (col. 7, lines 29-31). Specifically, it is taught that the protective layer is formed on the surface of the positive using a binder (the use of a binder constitutes an adherence) (col. 7, lines 18-21, lines 32-36; col. 12, line 58 to col. 13, line 6). Furthermore, the protective layer (porous film) is a mixture of particles of electro-insulative material (filler) with a binder (col. 7, lines 18-21). Alumina is within a list of electro-insulative materials, and is specifically used (in combination with titanium dioxide) in the example (col. 7, lines 1-10; col. 12, lines 58-63). It is taught that the electro-insulative (filler) is most preferably in the protective layer is 90-98% by weight (a portion that is completely within the claimed range) (col. 7,

lines 26-29). In the specified example of the protective, the filler material is a mixture of alumina and titanium oxide, wherein the only solid portion other than this such material is the use of CMC (0.5 wt %) and PVDF (2 wt %) (col. 12, line 58 to col. 13, line 2). Accordingly such a mixture would yield that the filler (alumina and titanium dioxide) material is in a weight percent of 97.5% (100%-0.5%-2%). Further it is noted that Miyasaka teaches of a wound battery (cylinder shape embodied), wherein there is a positive electrode [8] negative electrode [9] and a separator [10] separating them (fig.; col. 7, lines 50-65).

It is noted (a) that although Miyasaka exemplifies a non-woven sheet for a separator (col. 9, lines 64-67), such a material is not specifically used in an example, (b) that Miyasaka does not specifically mention the melt-down temperature of the separator, or (c) the exact the thicknesses of each individual section of the separator: 0.5 μm to 10 μm for the porous film layer (protective layer Miyasaka) and 15 μm to 25 μm for the non-woven fabric (rendered obvious to be separator of Miyasaka, set forth below with respect to section (a)) wherein the total thickness is 15.5 μm to 30 μm.

With respect to (a), it is first emphasized Miyasaka's teaching at the very least renders obvious the replacement of a non-woven, as it only exemplifies two types of separators, one of which is non-woven (col. 9, lines 62-67). Accordingly, although the separator used for the example is a polypropylene film (and not an explicit non-woven material) (col. 12, lines 29-31), Miyasaka's teaching at the very least renders obvious the replacement of a non-woven, as it only exemplifies two types of separators, one of which is non-woven. It has been held to be within the general skill of a worker in the art

to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416. Furthermore, since Miyasaka recognizes the use of both a sheet and a non-woven, at the very least, the substitution of the non-woven for the film in the example would have yielded the predictable result of acting as a separator material within the battery system. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to substitute a film separator for a non-woven separator, as Miyasaka specifically appreciates both types of separators, and wherein the substitution of one known, appreciated type (i.e. non-woven) for another known, appreciated type (i.e. film/sheet) would have yielded the predicable result of operating in the same manner.

Additionally, at this point Nakamizo et al. is also relied upon to give motivation, as to why one of ordinary skill in the art would have found to obvious to replace a polypropylene film with a non-woven of the same material. Nakamizo et al. teach that it is known to use microporous films, such as polypropylene, however, such films do not retain electrolyte well, which leads to an increase in internal resistance (para 0007). However, non-woven fabric separators (of, for example polypropylene) improve electrolyte-retaining nature (para 0008). Accordingly, the motivation to use a non-woven instead of a film electrolyte would be to improve electrolyte retention, which would in turn reduce internal resistance (para 0007-0008). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use a non-woven separator instead of a film separator (both embodied by

Miyasaka), as taught by Nakamizo et al. in order to improve electrolyte retention and reduce internal resistance.

With respect to (b), Shi et al. teaches a high melt integrity battery separator for lithium ion batteries (title). It is specifically Shi mentions that a non-woven separator comprising polypropylene is known to have a dimensional stability up to 167°C (para 0007, lines 8-11). Furthermore, Shi specifically notes that higher melt integrity is desired in order to not inhibit ion flow between the cathode and anode and in order to maintain dimensional stability (para 0008; para 0011). Therefore, Shi et al. provides motivation for wanting to make the separator have as high of a melt integrity (temperature) as possible (wherein at least 200°C is desired), which includes sustaining dimensional stability and strength and for promoting ion transfer (since ion transfer would be stopped if the melt integrity was too low, thus inhibiting the battery from operating) (para 0008; para 0011). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to impart as high of a melt integrity to the separator (167°C, 200°C, and 380°C specifically noted) as possible in order to improve dimensional stability of the separator at higher temperatures and in order to keep the ions flowing (to facilitate battery operation).

With respect to (c), it is noted that Miyasaka at the very least renders obvious the claimed ranges of the porous film thickness, non-woven fabric thickness, and the total thickness. First it is noted that the protective layer (porous film) has a preferable, exemplified range of between 2-10 μm (col. 7, lines 40-41). It is noted that exemplified range lies within the claimed range (of 0.5-10 μm). Furthermore, Miyasaka embodies

the thickness of the separator (embodied to be a sheet or a non-woven sheet), which is most preferably in a range of 5-30 μm (col. 9, lines 62-65; col. 10, lines 1-3). It is noted that this specifically appreciated range overlaps the claimed range (of 15-25 μm). Accordingly, a total thickness with respect to the individual thicknesses appreciated would be 7-40 μm, which also overlaps the claimed range. As Miyasaka embodies overlapping ranges for the porous film thickness, non-woven fabric thickness, and total thickness, it would at least render obvious the claimed range in such an overlapping manner. It has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985). Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969).

As to claim 4, Miyasaka embodies three specific separator materials, one of which is polypropylene (col. 9, lines 62-66). It is noted that polypropylene material is specifically embodied within the example (col. 12, lines 29-31). Accordingly, Miyasaka at the very least render obvious the use of polypropylene as the material for the separator. (It is reiterated that as set forth in claim 1, part (a), it would have been obvious to substitute the type of separator – i.e. non-woven for the film – within the

given example. Accordingly, the combination as made and applied to the specific example above would yield a non-woven polypropylene separator, further rendering obvious the material.)

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyasaka in view of Nakamizo, and Shi as applied to claim 1 above, and further in view of US 2002/0037450 (Suzuki et al.).

Miyasaka teaches binder materials for the protective layer. Such binder materials are the same as the ones used for the positive electrode materials, wherein carboxymethyl cellulose (CMC) is specifically appreciated (col. 7, lines 18-25). It is specifically noted more materials (wherein CMC is included) are exemplified in col. 8, lines 33-40). Miyasaka does not specifically teach of a binder having an acrylonitrile group.

However, Suzuki et al. specifically teach of a binder material used in the positive electrode of a lithium battery (para 0024). Specifically, the binder used is a combination of 2-ethylhexylacrylate, acrylic acid, and acrylonitrile (para 0031). The motivation for using such a binder is in order to have a binder that does not require heating to work and contains no water, in order to have a binder that is flexible but still maintains its form, and in order to provide a binder with the correct amount of stickiness and elasticity in order to prevent binder deterioration as well as to ensure strength (para 0031-0033). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use the binder taught by Suzuki et al. (containing acrylonitrile) as the binder in the protective layer of Miyasaka (instead of CMC), in order

to provide a binder that would be simple to use (as it does not require heat and does not have extraneous water) and in order to impart a better binder with the right amount of stickiness and elasticity (which ensures that the binder is not deteriorated and ensures proper imparting of strength to the layer). (It is again noted that Miyasaka teaches that the binder used in the protective layer is the same as that used in a positive electrode, and thus such a teaching is combinable.)

8. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyasaka in view of Nakamizo, and Shi as applied to claim 1 above, and further in view of US 2002/0064710 (Kawakami et al.).

As to claim 9, it is first noted that Miyasaka embodies three specific separator materials, one of which is polypropylene (col. 9, lines 62-66). It is noted that polypropylene material is specifically embodied within the example (col. 12, lines 29-31). Accordingly, Miyasaka at the very least render obvious the use of polypropylene as the material for the separator. (It is reiterated that as set forth in claim 1, part (a), it would have been obvious to substitute the type of separator – i.e. non-woven for the film – within the given example. Accordingly, the combination as made and applied to the specific example above would render obvious a non-woven polypropylene separator.) However, Miyasaka et al. do not specifically teach the use of a polyamide as the non-woven separator.

However, Kawakami et al. teach of a similar type of battery (lithium rechargeable embodied) (para 0002; para 0111). The separator is embodied to be non-woven fabric of materials such as polypropylene or polyamide (para 0107). Accordingly, Kawakami

et al. shows that polypropylene and polyamide (as non-woven cloths) are art-recognized equivalents for separator materials at the time the invention was made. Thus one of ordinary skill in the art would have found it obvious to substitute the polyamide non-woven fabric for the polypropylene non-woven fabric. It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the non-woven separator out of polyamide (instead of polypropylene), since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416. At the very least, the substitution of one type of known separator material (non-woven polyamide) for another would have yielded the predictable result of operating as a separator. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to substitute the polypropylene non-woven (rendered obvious by the combination of Miyasaka, Shi, and Nakamizo, and as embodied by Kawakami et al.) with a polyamide non-woven (taught by Kawakami et al.), as such a substitution would have yielded the predictable result of having a separator that functioned as such. "When considering obviousness of a combination of known elements, the operative question is thus "whether the improvement is more than the predictable use of prior art elements according to their established functions." *Id*. at ___, 82 USPQ2d at 1396." See MPEP §2141(I).

Response to Arguments

9. Applicant's arguments filed January 19, 2011 have been fully considered but they are not persuasive.

Applicant argues that Yamashita et al. fails to teach a separator comprising a non-woven fabric with a melt-down temperature of 150℃, wherein the combination with Fujiwara et al. is improper ((a) as it only mentions non-woven fabrics in passing and not in the examples, and (b) one of ordinary skill wouldn't not use non-woven fabrics due to risk of short circuits).

Examiner respectfully disagrees. First it is noted that Yamashita et al. is in combination with both Fujiwara et al. and Shi. (to render obvious the claimed invention). With respect to (a), it is uncertain how a teaching of non-woven fabrics does not render obvious the use of non-woven fabrics (whether or not it is mentioned in the examples or not). A teaching is a teaching, and thus it is improper to ignore teachings of the reference as a whole (as Applicant is suggesting), as the reference as a whole is being relied upon.

With respect to (b), Applicant is making conclusory statements without providing proof or reasoning as to its validity. Thus it cannot be found to be persuasive.

With respect to both (a) and (b), it is submitted that such a combination to render obvious the use of a non-woven fabric has been previously presented on Appeal, wherein the Board upheld the combination to render obvious such a combination. (See the Examiner Answer dated 8/1/08). Furthermore, it is submitted that the Board upheld the Examiner's rejection and stated: "Substituting a non-woven fabric for the polyethylene microporous film in the lithium secondary battery taught by Yamashita would have been no more than the use of a familiar element (the non-woven fabric) according to its known function (as a separator)" (see p8 of the Board decision dated

8/19/09). Applicant has not provided any further proof to show how the combination is not proper (beyond the data present in the Appeal). Accordingly, such arguments cannot be found to be persuasive (with respect to a rejection that has been upheld by the Board). According the arguments are not found to be persuasive, and the rejection of record is maintained.

Applicant argues (a) that Miyasaka fails to teach/suggest the use of a non-woven fabric, wherein (b) Nakamizo is relied upon to remedy the deficiency but cannot be combined, because Nakamizo teaches away from using a non-woven fabric due to deterioration in the cycle characteristics (like the microporous film).

Examiner respectfully disagrees.

With respect to (a), such a statement is completely untrue. The rejection has Miyasaka rendering obvious the use of a non-woven fabric without the combination of Nakamizo. The relevant portion of the rejection is reiterated fro clarity's sake.

> " With respect to (a), it is first emphasized Miyasaka's teaching at the very least renders obvious the replacement of a non-woven, as it only exemplifies two types of separators, one of which is non-woven (col. 9, lines 62-67). Accordingly, although the separator used for the example is a polypropylene film (and not an explicit non-woven material) (col. 12, lines 29-31), Miyasaka's teaching at the very least renders obvious the replacement of a non-woven, as it only exemplifies two types of separators, one of which is non-woven. It has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design

choice. *In re Leshin,* 125 USPQ 416. Furthermore, since Miyasaka recognizes the use of both a sheet and a non-woven, at the very least, the substitution of the non-woven for the film in the example would have yielded the predictable result of acting as a separator material within the battery system. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to substitute a film separator for a non-woven separator, as Miyasaka specifically appreciates both types of separators, and wherein the substitution of one known, appreciated type (i.e. non-woven) for another known, appreciated type (i.e. film/sheet) would have yielded the predicable result of operating in the same manner."

Accordingly, such an argument is baseless and irrelevant, as Miyasaka et al. is relied upon by itself to render obvious the use of non-woven fabric (wherein Applicant has not provided any proof or reasoning as to why it would not be obvious over Miyasaka et al. According the arguments are not found to be persuasive, and the rejection of record is maintained.

With respect to (b), the teaching in Nakamizo et al. shows what is known in the art. How is a showing as to separator material known in the art be a teaching away from such material? Additionally, there is no statement as to how such known materials cannot be used as separator materials (just that there may be different advantages and disadvantages to known materials, which would also be known by one of ordinary skill in the art). Accordingly, the recognition of a disadvantage does not constitute a teaching away. Additionally, the teaching in para 0008 of Nakamizo et al. clearly

compares non-wovens to microporous films (both appreciated in Miyasaka et al.), and thus would be applicable to Miyasaka for such a teaching (with respect to finding non-woven fabrics advantageous for electrolyte holding). According the arguments are not found to be persuasive, and the rejection of record is maintained.

Applicant (a) (again) argues that that criticality to the claimed invention has been shown in Tables 1 and 2 and again compares Comparative Example 4 (PE microporous film with a porous film) and example 5 (polypropylene non-woven fabric with a porous film) pointing to how Example 5 has a better nail safety data than Comparative Example 4, (b) stating that such a characteristic is not predicted by Nakamizo.

Examiner respectfully disagrees.

With respect to (a), it is submitted that such arguments were presented in the Appeal, and they were answered fully (see Issue 1(b) in the Examiner Answer dated 8/1/08). Furthermore, it is submitted that the Board upheld the Examiner's rejection and stated: "Appellants have not provided sufficient evidence of superior unexpected results" (see the last paragraph of p8 of the Board decision dated 8/19/09). Previously presented data that were found (by both the Examiner and the Board) to be insufficient to show unexpected results cannot be found to be convincing to provide unexpected results at this point. Applicant has not provided any further proof (beyond the data present in the Appeal), and thus it is submitted that no unexpected results have been shown.

The corresponding portion of the response to Issue 1(b) in the Examiner's Answer is reiterated herein for clarity's sake with respect to the fact that no unexpected results have been shown.

" Regarding the nail penetration safety: Comparing examples 5 and 24 to comparative example 4 shows that the temperatures obtained by the tests are different. However, this is not a showing of unexpected, superior results. The data points given for example 5 are 74, 94, 72, and 89 °C. The data points given example 24 is 65, 93, 72, and 95 °C. The data points given for comparative example 4 are 80, 149, 77, and 91 °C. The temperatures for the first, third, and forth points are relatively similar (with comparative example 4 testing better at the fourth point – nail speed of 180 mm/s after 90s). However, Appellant fails to represent the full scope of the claims with the above comparison. For example, example 2 has nail penetration safety data wherein the first three data points are similar to that of comparative example 4 and the fourth point (at a speed of 180 mm/s after 90 s) is much worse: 78, 139, 77, and 136 °C. With this example present, Examiner is unsure how Appellant's claimed invention truly is shown to have superior results. Additionally, Examiner would like to note that the comparisons of comparative example 4 and the examples are not commensurate in scope. It is shown that the examples use a separator *material* (not just separator type (non-woven cloth/microporous film)). In table 1, it can be seen that PP (polypropylene) non-woven cloth is embodied in most of the examples with one example using a PP-PA (polypropylene-polyamide) non-woven fabric. The separator of comparative example 4 is PE (polyethylene). Therefore, the materials being compared are different, and different materials have different characteristics (i.e. it is seen that the meltdown temperature of PE is lower than

that of the tested PP and PP-PA). Therefore, the examples fail to show that it is really the material type (non-woven cloth/microporous film) and not the material itself (PP or PP-PA vs. PE) that provides these differences, as there is no example showing the use of a PE non-woven cloth separator.'"

With respect to (b), it is submitted that such an argument is not necessarily relevant (as Nakamizo et al. is not necessarily relied upon to render obvious the use of the non-woven fabric). Additionally, it appears that Applicant may be arguing a different reason to combine (i.e. nail penetration rather than electrolyte holding); however, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). Again, unexpected results must be clearly shown in order to overcome obviousness, wherein Applicant has not done so. (As set forth in this rejection, in previous rejections, and as affirmed by the Board.) According the arguments are not found to be persuasive, and the rejection of record is maintained.

Applicant argues that the surface temperature of example 5 (152℃) is improved over comparative example 4 (160℃).

Examiner respectfully disagrees. First, it is submitted that the difference between 152 and 160° C is small (only 5%). Accordingly, it is submitted it is unsure how any unexpected results are achieved (as Applicant does not further explain how such a different would be unexpected). According the arguments are not found to be persuasive, and the rejection of record is maintained.

Applicant states that electrolyte retention has nothing to do with the improved characteristics, and thus tables 1 and 2 show unexpected results.

Examiner respectfully disagrees. How is electrolyte retention unrelated to charge/discharge characteristics or cycle characteristics? (Electrolyte transfers the ions for the electrochemical reaction, thus one of ordinary skill would expect electrolyte retention to affect some of the characteristics in tables 1 and 2.) Examiner invites Applicant to provide proof that electrolyte retention does not affect cycle characteristics and charge/discharge. Accordingly, such a submission (for the reasons set forth above) is already seen to be untrue. Additionally, arguments with respect to unexpected results were presented in the Appeal, and they were answered fully in the Examiner Answer dated 8/1/08. Furthermore, it is submitted that the Board upheld the Examiner's rejection and stated: "Appellants have not provided sufficient evidence of superior unexpected results" (see the last paragraph of p8 of the Board decision dated 8/19/09). Previously presented data that were found (by both the Examiner and the Board) to be insufficient to show unexpected results cannot be found to be convincing to provide unexpected results at this point. Applicant has not provided any further proof (beyond the data present in the Appeal), and thus it is submitted that no unexpected results have been shown.

Applicant argues that the prior art rejections do not teach the claimed invention (the limitations recited in the claimed omitted for brevity's sake).

Examiner respectfully disagrees. The rejection as well as response to Applicant's arguments clearly show that the claimed limitation have been met (wherein

at this point Applicant has not particularly pointed out any limitation not addressed in the remarks above that have not been addressed). Accordingly, Examiner submits all claim limitations have been met. Applicant appears only to argue the same points that were discussed on appeal (wherein the Board affirmed Examiner's rejection as well as the fact that the data provided does not show unexpected results) and to add new matter in attempts to overcome the rejection. As Applicant has not provided new data and has not clearly shown how the rejection of record does not render obvious the claimed invention, such arguments are not found to be persuasive, and the rejection of record is maintained.

Applicant argues that the dependent claims are distinct from the prior art of record for the same reason as the independent claim.

Examiner respectfully disagrees. The rejection with respect to the independent claim has been maintained, and thus the rejections to the dependent claims are maintained as well.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EUGENIA WANG whose telephone number is (571)272-4942. The examiner can normally be reached on a flex schedule, generally 6 - 3:30 Mon. - Thurs., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/E. W./
Examiner, Art Unit 1726

/Gregg Cantelmo/
Primary Examiner, Art Unit 1726